3.3 Water

The following sections describe the existing conditions of water resources in the region of the BP Cherry Point Cogeneration Project and assess the Project's potential for impacts to the existing environment. In addition, the section addresses mitigation measures to be implemented if impacts are evident during construction, operation, and maintenance of the Cogeneration Project. For a more detailed discussion of water resources refer to Part III, Appendix F: Technical Report on Water.

3.3.1 Existing Conditions

The Cogeneration Project is located within what is commonly called the Mountain View Upland of Whatcom County (Newcomb, et al. 1949). The topography for the proposed facility and its water pipeline routes and the transmission line route can be characterized as slightly undulating, but fairly flat overall. Elevations within the site range from 120 feet above MSL to 100 feet above MSL with the site sloping to the northwest toward Terrell Creek. For map depicting the Terrell Creek Basin, see Figure 3.3-1. Existing site slopes range from 0.5% to 1%. Drainage ditches exist along the side of Grandview Road and in other locations where natural topography provides drainage.

Existing vegetation on the proposed Cogeneration Project site consists of grasslands and low-grade wetlands with small areas planted with a hybrid poplar tree crop. The wetlands are attributed to poor drainage resulting from low permeability soils such as clays and silts. Refer to Section 3.1, Earth, for a more detailed discussion on site soils. Wetlands exist on the plant site. A detailed discussion of wetlands and vegetation is presented in Section 3.4.

No access roads exist within the Cogeneration Project site boundaries. Blaine Road, which runs between the site and the laydown areas, is paved.

3.3.1.1 Surface Water

Terrell Creek drainage basin is depicted in Figure 3.3-1 and is about 17 square miles in extent. Terrell Creek is the only significant surface water feature within 0.5 miles of the proposed facility. Terrell Creek drains an irregular shaped section of the Mountain View Upland between the settlement of Mountain View and Birch Bay. The source of Terrell Creek is Terrell Lake, however most streamflow is obtained from surface water runoff rather than from the lake. As such, Terrell Creek streamflow is highly seasonal. From the lake, the stream meanders in a northwesterly direction, and after two miles is joined by Fingalson Creek from the east. Shortly thereafter, the main stem turns west and flows as far as Point Whitehorn Road on the shore of Birch Bay. All stream flow is derived from surface runoff and baseflow is practically non-existent. This creek dries up completely most summers (State of Washington Department of Water Resources 1960). No usable hydrologic data were found for Terrell Creek.

The Cogeneration Project site is located in a drainage subbasin measuring approximately 795 acres. It slopes downwards toward the northwest. Surface water runoff from the Cogeneration Project site currently discharges to surrounding wetlands and drainage ditches, which when flowing ultimately discharge into Terrell Creek, approximately 1 mile to northwest of the Project site.

Water Quality:

No standards or other parameters are at risk from the proposed power plant, water pipelines, natural gas pipeline connections, and transmission lines. Information on water quality of Terrell Creek was not found. State Water Quality Classifications are found in Chapter 173-201a of the Washington Administrative Code (WAC). There are no specific classifications for Terrell Creek or Terrell Lake. Therefore, both fall under Chapter WAC 173-201A-120 general classifications and are classified as Class AA, ~~excellent~~ extraordinary waters. Class AA waters must meet the water quality criteria as found in Chapter 173-201A–030.

Neither Terrell Creek nor Terrell Lake are included in the Washington Department of Ecology's (Ecology) section 303(d) list of impaired waters and there are no Total Maximum Daily Load (TMDL) plans or other existing water quality limitation in effect for either waterbody.

However, some complaints have been received by Ecology regarding bad smell, color, sheen, and temperature in Terrell Creek. Monitoring data to substantiate these complaints could not be found.

Run-off and Stormwater:

The Cogeneration Project site receives approximately 40.7 inches of precipitation annually (Goldin 1992). Due to the medium to low permeability of the soils covering the Project site, stormwater does not infiltrate easily into the ground. However, due to the low slope and the vegetation type, stormwater runoff is not substantial, and does not lead to sediment and erosion impacts. Currently, stormwater runoff at the proposed site flows into drainage ditches, which exist along Grandview and Blaine Road and in other locations where natural topography provides drainage. The drainage and stormwater run-off pattern in the vicinity of the proposed Cogeneration Project site is shown on Figure 3.3-2. When flowing, drainage conveys stormwater runoff eventually into Terrell Creek, which eventually empties into Birch Bay of the Strait of Georgia.

Floodplain Potential:

The Cogeneration Project and its ancillary facilities are all located outside the 5-year, 100-year, and 500-year floodplains. Figure 3.3-3 shows the proximity of floodplain boundaries to the Cogeneration Project site. The following Federal Emergency Management Agency (FEMA) Floodplain mapping was reviewed:

- City of Bellingham, Washington, Whatcom County, Panels 1-10 (effective date: September 2, 1982),
- City of Blaine, Washington, Whatcom County, 1 panel only (effective date: July 16, 1979),
- City of Everson, Washington, Whatcom County, 1 panel only (effective date: August 2, 1982),
- Town of Ferndale, Washington, Whatcom County, 1 panel only (effective date: June 1, 1983),

- City of Lynden, Washington, Whatcom County, 1 panel only (effective date: November 3, 1982),
- City of Nooksack, Washington, Whatcom County, 1 panel only (effective date: September 2, 1982),
- City of Sumas, Washington, Whatcom County, 1 panel only (effective date: May 15, 1985).

3.3.1.2 Groundwater

The geologic stratigraphy typically encountered in the Mountain View Upland is described in more detail in section 3.1 Earth. Borehole/well logs in the vicinity of the Cogeneration Project are provided in Part III, Appendix G: Technical Report on Earth and indicate the stratigraphic sequences to be present in the Mountain View Upland area. Figure 3.3-4 shows borehole/well locations and Figures 3.3-5 through 3.3-8 illustrates the geologic cross sections indicated by these borehole/well logs. The unconsolidated strata in the area represent materials mainly deposited during the Everson Interstade and the Vashon Stade during the Pleistocene. Along the shoreline and Terrell Creek mouth a more recent Sumas Interstade surface deposit (Terrace Deposits–Qt) is present. In deeper horizons, undifferentiated Quaternary deposits exist that are possibly of earlier glacial/marine origins. Undifferentiated sandstone bedrock was encountered about two miles northeast and north of the Cogeneration Project at depths over 200 feet, but was not found in boreholes closer to the Cogeneration Project to depths of 650 feet. A more detailed description of the geology of the Cogeneration Project area is presented in Section 3.1 – Earth.

Regional Hydrostratigraphy:

Hydrostatigraphic units align closely to the geologic units. The major water-bearing units are the predominately sand and gravel geologic strata. Aquifers are typically within the Deming Sand (Qd) and the Esperance Sand Members. The marine drifts of the Bellingham (Qb) and Kulshan (Qk) and glacial Vashon Till (Qvt) are typically aquitards that have low permeability are restricting groundwater flow. These marine drifts can locally contain elevated sand and gravel content, but have sufficient silt and clay content to have very low permeabilities. Although the marine drifts and glacial tills could contain sand and gravel lenses, the extent of such lenses is typically limited and does not yield significant quantities of water.

Detailed hydrogeologic studies at the Refinery have discovered the upper portion of the Bellingham Drift to be weathered to depths of 20 feet and are more permeable than the lower unweathered portions of this Member. The surficial sand and gravel (Qbg) and weathered Bellingham Drift together comprise the uppermost water-bearing zone in the hydrostatigraphic sequence.

Project Site Hydrostratigraphy:

The hydrostratigraphy described in the Mountain View Upland area above is anticipated to represent the units underlying the Cogeneration Project. Although geologic and hydrologic investigations or data do not exist specifically for the Cogeneration Project site location, the geology, and hydrostratigraphy illustrated in Figures 3.3-4 through 3.3-8 are representative of anticipated conditions and unit depths underneath the Cogeneration Project site.

Groundwater Movement:

Groundwater movements within the Whatcom Basin have been reported in Newcomb, et al. (1949) and Easterbrook (1973). The reports do not provide groundwater movement in specific aquifers, but instead, are referred to as "water table contours on top of essentially common water body." Generalized contours of the surface of the water table are shown on Figure 3.3-9. These contours represent horizontal potentiometric gradient in the groundwater system. Groundwater flow is perpendicular to the gradient and is indicated by the flow arrows. The groundwater in the water table generally is flowing toward the west across the Cogeneration Project site. A more detailed description of groundwater flow in the area surrounding the Project site is presented in Part III, Appendix F: Technical Report on Water.

Recharge and Discharge:

The Deming Sand (Qd) aquifer is likely recharged via local precipitation over elevated areas such as Holman Hill located about 2 miles east of the Cogeneration Project. Recharge also occurs over a broad area to the Deming Sand aquifer via infiltration through the Bellingham Drift. Although the Bellingham Drift is an aquitard, leakage through this unit over large areas does provide recharge. Discharge from the Deming Sand is likely to the lower reaches of tributary drainages near sea level or to the Strait of Georgia depending on the location and configuration of the aquifer.

The older and deeper Vashon and pre-Vashon aquifers are likely part of a regional groundwater flow system within the overall Whatcom Basin. Recharge likely occurs inland, possibly on the higher elevation fringes of the basin. Groundwater in the Vashon and older aquifer systems discharge offshore to the Strait of Georgia.

Interaction with Surface Water:

Groundwater in the upper water-bearing zone is in hydraulic continuity with the local streams, namely Terrell Creek. The Deming Sand is found beneath 50 to over 70 feet of low-permeability Bellingham Drift. Water levels in wells in the Deming Sand aquifer are often in excess of 50 feet below ground surface. Terrell Creek is effectively isolated (perched) from the Deming Sand, Vashon, and pre-Vashon aquifers at the Cogeneration Project location. Impacts from pumping wells completed in the Deming Sand aquifer would be felt downgradient, near the groundwater discharge point for the aquifer. Deeper wells in the Vashon and pre-Vashon deposits would not impact surface water since they would capture groundwater that discharges offshore to the Strait of Georgia.

Aquifer Characteristics:

Primary aquifer parameters described in this section include porosity and hydraulic conductivity. Porosity measurements in the Bellingham Drift range from 0.33 to 0.50. The Deming sand has been described as silty sand-to-sand and gravel unit. Porosity is anticipated to total between 0.25 and 0.35 with and effective porosity for water transmission of about 0.2 to 0.25 (Remediation Technologies, Inc. 1993).

The hydraulic conductivities of the weathered and unweathered portions of the Bellingham Drift ranged from 5.2 E–4 to 1.2 E-8 cm/sec in the weathered Bellingham Drift and 7.7 E-6 to 1.7 E-8 cm/sec in the unweathered Bellingham Drift. The hydraulic conductivities of the Deming Sand aquifer range from 5.7 E-5 to 3.8 E-8 cm/sec. The results for the Deming Sand aquifer may be low because the wells partially penetrated this unit only a few feet. An earlier estimate of hydraulic conductivity for the Deming Sand aquifer was 5 E-3 to 5E-4 cm/sec based on grain size descriptions (CH2M HILL 1983).

Groundwater average linear horizontal velocities in the weathered Bellingham Drift unit were estimated to be between 0.1 and 0.8 ft/yr (Remediation Technologies, Inc. 1993). Groundwater average linear horizontal velocity) in the Deming Sand aquifer have been estimated to be 25 to 260 ft/yr (CH2M HILL 1985).

Groundwater Quality:

Groundwater quality within the Whatcom Basin typically has low dissolved solid content and is usable for domestic and public water supply. The salinity of the sand and gravel aquifers in the Mountain View Upland area is low (generally below 20 ppm of chloride). Reports indicate that the deeper pre-Vashon sediments contain water of good quality even from strata hundreds of feet below sea level (Newcomb, et al. 1949) the area. Groundwaters in Tertiary bedrock commonly contain elevated salinity levels when encountered.

The most objectionable constituent in basin groundwater in the western Whatcom Basin is elevated iron (Newcomb, et al. 1949). Its occurrence is confined almost entirely to recessional outwash sands and gravels and recent alluvial deposits. A borehole log of well 40/1E-33 G reports a "sulfur smell " odor, possibly hydrogen sulfide. Such occurrence may be due to peat or swamp deposits in close proximity to the aquifer (Newcomb, et al. 1949).

3.3.1.3 Water Use

Water use in the area is predominantly for agriculture, municipal supplies, commercial and industrial processes and domestic supplies. The Refinery currently uses an average of 4170 gpm for industrial water, which is supplied under agreement with the Whatcom County Public Utility District No. 1 (PUD). Potable water is supplied to the Refinery by Birch Bay Water and Sewer District (District).

3.3.1.4 Applicable Water Rights

A review of Ecology's Water Right Application Tracking (WRAT) database (August 2001) was conducted to evaluate the potential impacts to water rights as a result of the construction and operation of the Cogeneration Project. Water Rights surrounding the site are designated to have a purpose of use for irrigation, domestic single, domestic multiple, municipal, wildlife, and commercial and industrial manufacturing. Water rights Certificates, Permits, and Applications within a mile of the site are summarized below:

- 3 certificated surface water rights, and
- 9 groundwater rights (4 applications and 5 certificated).

Many small "EXEMPT" wells (less than 5,000 gallons per day and do not require a water right) may be in use, within the 1-mile radius, for domestic water supply but are not documented in Ecology's WRATs database.

Industrial process water is currently supplied to the Refinery through an existing agreement between BP and the PUD. This water ~~would be untreated~~ is surface water diverted from the Nooksack River, upstream of Ferndale. The existing agreement between the PUD and BP provides for the supply of up to 11 mgd of water from the PUD, from January 1, 2000 to December 31, 2030. The point of delivery is at the existing Refinery meter.

~~Operation of the Cogeneration Project would require an increase over existing use of only 40 gpm of water on average and would not require an amendment to the existing agreement between BP and the PUD.~~ Water used for industrial purposes within the Cogeneration plant is to be supplied by the PUD. The PUD will obtain recycled once-through cooling water from the Alcoa aluminum smelter located near the BP Refinery. The Cogeneration Project will reuse the industrial water from Alcoa for its evaporative cooling system and boiler feedwater needs.

The District would provide potable (treated) water for use by Cogeneration Project employees under an existing agreement with BP. The amount of potable water required for operation of the Cogeneration Project is anticipated to average between 1 and ~~2~~5 gpm. The District currently purchases water from the City of Blaine according to Department of Health data.

Surface and groundwater Certificates, Permits, Claims and Applications recorded by Ecology for the PUD, the District, and the City of Blaine are presented in Tables 3.3-1 and 3.3-2. A summary of water rights recorded by Ecology for both Terrell Creek, the Nooksack River and their tributaries that are within WRIA 1 and Whatcom County are summarized in Part III, Appendix F: Technical Report on Water (Attachment F).

3.3.1.5 Refinery Wastewater

The Refinery's wastewater is directed to the Refinery's onsite wastewater treatment facility. Once treated, the water is discharged via the Refinery's existing wastewater discharge point at the Cherry Point terminal through Outfall 001 under an existing NPDES permit. The Refinery's sanitary wastewater would be directed to the District's sewage treatment facility, under an existing agreement. The Cogeneration Project would discharge wastewaters and sanitary wastes to the Refinery systems for treatment and disposal.

3.3.2 Impacts to Water

3.3.2.1 Water Rights Options and Changes

No new water rights or changes to existing water rights would be required for the development of the Cogeneration Project. Water would be supplied through a water reusen ~~existing~~ agreement between the PUD, ~~and~~ BP and Alcoa. ~~The small amount of additional water required will not require an amendment to the existing agreement.~~

The District currently purchases potable water from the City of Blaine according to Department of Health data. The Cogeneration Project would be expected to require only 1 to ~~2~~5 gpm of potable water on average. This nominal amount will not impact available supplies or resources of potable water under current certified rights.

3.3.2.2 Water Supplies Impacts

Cogeneration Project Construction:

During construction, non-potable water would be supplied by temporary connection to the Refinery. A piping system would distribute the water to taps including a fill station for water trucks located in the work area. Water trucks will ~~to~~ provide dust control during construction (anticipated to be about 7 million gallons over the entire construction period). ~~and to provide d~~Drinking water ~~to~~for construction workers will be provided by a water service to be contracted by the site contractor. ~~The water service could be contracted out to a local company or supplied by the site contractor.~~

Water for HRSG and export steam line steam-blow tests and hydrostatic tests will be required for the commissioning of the power plant facilities, natural gas connections, and water supply/discharge connections. The source of the test water is the fresh industrial water supplied from the PUD. The volume of water needed for HRSG steam-blow testing will be about 15.5 million gallons, ~~and for~~for export steam line steam-blow testing will be about 1.2 million gallons, and hydrostatic testing will likely not exceed ~~3~~ 4.8 million gallons. Testing would take place near completion of construction over a period of two to three months.

Cogeneration Project Operation:

The Cogeneration Project would ~~minimize~~conserve fresh water ~~consumption~~ by reusing water from the Alcoa Intalco Works for the Cogeneration Project. 2,780 gpm of non-contact, once-through cooling water is available from Alcoa. Because the Cogeneration Project requires an average of 2,244 to 2,316 gpm of water, the remaining recycled water will be used by the Refinery and other users to reduce fresh water usage, reducing the fresh water needed to be withdrawn from the Nooksack River by an average of 484 to 556 gpm.~~using an Air Cooled Condenser (ACC) and sharing water with the Refinery in a way that maximizes recycling and reuse. The use of an ACC instead of an evaporative cooling system represents a dramatic reduction in the consumption of water for the Cogeneration Project.[1]~~ In addition, the Cogeneration Project boiler ~~feed water~~ blowdown is ~~also~~ being recycled for use in the ~~Refinery~~ Project cooling tower, which further reduces the consumption of water with the proposed system.

~~As a result, the Cogeneration Project will increase average water consumption by 40 gallons per minute (gpm). Currently, the Cherry Point Refinery receives 4,170 gpm of fresh water from the PUD. The total combined water consumption during operation of the Refinery and Cogeneration Project facilities is estimated to be 4,210 gpm (see Figure 3.3-10). The increase of 40 gpm in consumption of industrial water and 2.5 gpm of potable water represents a nominal increase of water from the PUD and the District's systems and will not impact available supplies.~~

Normal fluctuations in the Refinery's steam demand and seasonal ambient temperature changes would affect the Cogeneration Project's water consumption. Warmer ambient temperatures in the summer increase water use and cooler ambient temperatures in the winter decrease water use as a result of changes in evaporation rates in the cooling

~~[1] BP's goal is to minimize fresh water consumption. If a practical and feasible opportunity arose to reuse industrial wastewater in a wet-cooling system, BP would consider that option. At this time, however, BP is proposing an air-cooled system.~~

tower. Lower steam consumption by the Refinery increases Cogeneration Project water usage because of higher condensing duty.

Cooling tower cycles of concentration are typically maximized to conserve water and treatment chemicals, but may change if makeup water quality changes. It is expected that the cooling tower will operate between 10 and 15 cycles of concentration. For additional information on ambient temperature and steam production impacts on water usage please see Part III, Appendix F: Technical report on Water.

There would be a nominal increase of potable water use of 1 to 5 gpm.

3.3.2.3 Cogeneration Project Wastewater Impacts

Wastewater sources include the following:

- Treatment of raw water to produce high quality boiler feedwater (BFW) and Refinery return condensate treatment; ~~Demineralization plant treatment of raw water to produce high quality boiler feedwater (BFW)~~
- Collection of water and/or other minor drainage from various types of equipment;
- Cooling tower blowdown, and
- Sanitary waste collection.

The estimated flow and chemical composition of wastewaters from the Cogeneration Project are provided in Table 3.3-3, except for the sanitary wastewater stream.

There is also a periodic wastewater stream generated when a gas turbine is shut down in order to wash the turbine blades and restore peak operating efficiency. This is done ~~twice~~ once per ~~year~~ quarter per gas turbine at most, depending on blade fouling severity. The operation generates approximately ~~1,250~~2,300 gallons of water per wash containing ~~airborne~~ dirt deposits during operation that have been removed from the blades, along with detergents used for the cleaning operation. The water is collected in a sump and trucked ~~or pumped to the Refinery~~ for treatment and disposal.

The boiler feed water blowdown from the Cogeneration Project will be reused in the ~~Refinery~~ Cogeneration Project cooling tower and is not considered a waste stream.

The streams generated during normal operation represent the majority of the wastewater flows and are handled as follows:

- Raw water treatment waste and Refinery return condensate treatment waste

  Filters are used to remove the relatively small amount of suspended solids present in the ~~raw~~ recycled water received from the PUD~~refinery~~. Filtration is required as a first step in the production of high quality boiler feedwater (BFW). Periodically, each of the three filters in the unit is backwashed to remove the solids from the filter media. The backwash water is collected in a large tank (~~Neutralization~~ Equalization Tank), which is ~~periodically~~ then pumped at a controlled rate~~,~~ to the refinery's ~~oil~~ wastewater ~~system for treatment.~~ treatment system.

  The condensate being returned from the Refinery to the Cogeneration Project will be treated through a precoat filter system to remove any trace oil. When the precoat filter material is replaced, the spent precoat material (a mixture of powdered cellulose and powdered activated carbon) would be collected in a tank and dewatered for disposal along with other primary waste ~~sludges~~sludge generated within the Refinery. The water removed from this process would be sent to the Refinery wastewater treatment plant.

Ion exchange units are also to purify recycled~~raw~~ water from the PUD and condensate returned from the Refinery, and boiler blowdown sent to the Cogeneration plant from the Refinery. Dissolved ionic species must be removed in order to generate high-pressure steam in the HRSGs without fouling or corroding the boiler tubes. The resins in the ion exchange units eventually become saturated as their capacity for removing ions has been reached. It is then necessary to regenerate these resins with dilute sulfuric acid and sodium hydroxide. These chemicals, along with the removed ions and rinse waters, are collected in the Neutralization Tank, neutralized to a pH between 6.5 and 8.5, then pumped to the equalization tank and then to the Refinery wastewater treatment system ~~for treatment~~. The filter backwash is also part of this stream.

- Equipment Drains

  Some pumps and steam turbines may use small quantities of water to cool bearings or lubricate seals. Water draining from this equipment has the potential to come in contact with surfaces that may have lubricating oil on them. As such, this wastewater has the potential to contain trace free oil. In addition, some equipment must be flushed with water prior to being opened for maintenance. This water may also contain impurities, which require treatment. These waters are collected in a sump, held in an equalization tank, and pumped to the ~~refinery's~~ Refinery's wastewater treatment system ~~for treatment~~.

- Cooling Tower Blowdown

  The blowdown from the Cogeneration Project cooling tower will be held in an equalization tank with the other cogeneration wastewater streams (except sanitary wastes) and pumped at a controlled rate to the Refinery wastewater treatment system.

- Sanitary Waste

  Sanitary waste from cogeneration unit employees will be collected in a sump and pumped to the refinery's sanitary system for treatment by the District. The estimated amount of sanitary waste generated by the Cogeneration Project is between 1 and ~~2~~ 5 gpm. The District will treat the Refinery and Cogeneration Project sanitary wastes before discharge to the Strait of Georgia.

After treatment in the Refinery wastewater treatment system, wastewater from the Cogeneration Project would be discharged along with the Refinery wastewater to the Strait of Georgia. The Cogeneration Project will ~~produce~~ add approximately ~~50~~ 190 gpm, assuming 15 cycles of concentration in the cooling tower, to the Refinery discharge. Table 3.3-4 presents a numerical analysis of the potential impact of the Cogeneration Project wastewater on the Refinery's wastewater stream. ~~As can be seen from this table, the impact would be negligible.~~ The impact analysis is based on the average discharge from the Refinery wastewater treatment study that was conducted ~~last~~ in July, August, and September of 2001.

3.3.2.4 Stormwater Impacts

Flood Potential:

Figure 3.3-3 is a map showing the proximity of floodplain boundaries to the proposed Cogeneration Project site. The proposed Cogeneration Project and all associated components are not located within the 5-, 100-, or 500-year floodplains and therefore flooding is not an issue. This is the case during construction, operations, and maintenance of the facility.

Stormwater Quantity:

For stormwater runoff rates and quantity during construction and operational activities of the plant site, please see Part III, Appendix F: Technical report on Water -- Attachment A, *"Surface Water Management System Design Basis"* and supplemental technical memoranda, prepared by Golder Associates, December 20, 2001 and March 2003. This report identifies the statistical storm intensities, anticipated quantity of stormwater during the construction and operation of the Cogeneration Project and presents the proposed stormwater collection and treatment system. The Cogeneration Project stormwater collection and treatment system will allow infiltration to occur and proper detention of stormwater to minimize peak discharge flows. The final discharge will be to wetlands for enhancement where the water will be able to infiltrate and recharge the shallow groundwater-bearing zone. The stormwater collection, treatment, and discharge will be within the same hydrologic basin where the stormwater originates. Hence, no significant changes to the quantity of water will result to the basin from the construction and operation of the Cogeneration Project.

Stormwater Quality:

During construction and operation of the Cogeneration Project, the potential exists for impacts to stormwater quality either from sediment loading or from accidental spills. Spill prevention, control with secondary containment and prompt cleanup will be the primary means of maintaining stormwater quality. The quality of the stormwater during construction and/or operation of the Cogeneration Project plant will be controlled and treated before discharge to the natural environment.

During construction, sediment and erosion control measures will be implemented to control the quality and volume of stormwater runoff such that it complies with regulatory standards. Stormwater will be routed through engineered oil/water separation systems designed to contain accidental spills and detention ponds to maintain turbidity levels of discharge water to be less than 5 NTU (turbidity units) over background turbidity if background is 50 NTU or less, or be less than 10 percent above background turbidity when background is greater than 50 NTU. ~~50 NTU (turbidity units)~~. Perimeter drainage ditches will divert runoff from undisturbed areas, which reach the Cogeneration Project site. These drainage ditches and the water detention ponds will be designed to keep the turbidity of this detention pond effluent water at permitted levels.

During Cogeneration Project operation, runoff from operational areas within the plant site will be within required limits after treatment. Runoff from surfaces, which potentially may be impacted by grease or oil, will be treated using an oil/water separation system and a wetpond for additional treatment and detention. Oil and grease concentrations will be less than ~~10~~ 15 mg/L, and turbidity will be less than 5 NTU (turbidity units) over background turbidity if background is 50 NTU or less, or be less than 10 percent above background turbidity when background is greater than 50 NTU. 50 ~~NTU~~.

3.3.2.5 Groundwater Impacts

The proposed Cogeneration Project will have no adverse impact on groundwater resources or recharge to the groundwater systems during construction, maintenance, or operations of the Cogeneration Project facility.

Potential Chemical Impacts to Groundwater:

The potential for accidental spills to impact the groundwater system is remote. Fuels and lubricants required for equipment during construction will be stored within containment dikes or otherwise protected against spillage. Chemicals used in the operation of the Cogeneration Project will be stored within secondary containment dikes or otherwise protected against spillage. (See Part III, Appendix F: Technical Report on Water for more details). The SPCC Plan will address the prevention, control, and countermeasures that are in place to ensure that accidental spills do not reach the natural environment.

If an accidental release occurred and reached bare ground, the Bellingham Drift is expected to be an effective soil medium to absorb and retard the migration of accidental releases of contaminants to the subsurface environment. Media specific characteristics that influence the migration of contaminants are liquid (impacted water or non-aqueous liquids) transmissive properties and the geochemical reactive properties with the contaminants. Overall the substrate at the proposed Cogeneration Project is effective at containing potential releases of contaminants to the subsurface environment. The substrates not only restrict the movement of water and liquids in general, but also have geochemical characteristics that will adsorb and retard potential releases of contaminants from the proposed Cogeneration Project (see Part III, Appendix F: Technical Report on Water for more details).

Aquifer Recharge:

Recharge to the upper water-bearing zone is by direct rainfall precipitation and infiltration. The water levels in upper water-bearing zone are shallow (< 5ft depths at many locations) and are best described as perched groundwater in hydrologic continuity with the surrounding wetlands.

Recharge to the Deming Sand Aquifer will not be affected by stormwater control for the Cogeneration Project. The Deming Sand aquifer is recharged from distant hills and from leakage through the overlying Bellingham Drift aquitard. The leakage through the Bellingham Drift occurs over the entire aquifer aerial extent. Any effect on the saturated zone within in this aquitard from stormwater control and diversion is not expected to be measurable. Hence, the leakage and recharge to the Deming Sand aquifer would not be impacted in the immediate Terrell Creek basin comprising 17 square miles.

Most of the stormwater collected on the Cogeneration Project site will be routed to an unlined surface detention pond and allowed to infiltrate or discharge to wetlands within the same hydrologic basin. The net effect would be returning the collected stormwater to the same hydrologic system for recharge. Some containment systems, such as secondary containment for transformers, would have a very low probability for receiving contaminated stormwater. These systems would be equipped with outlet valves to allow for the inspection of the water before releasing. The operation of these systems would be addressed in the Cogeneration Plant operating procedures to avoid the contamination of the stormwater system. Stormwater that accumulates within storage tank containment structures represents less than 5 percent of the entire stormwater to the proposed Cogeneration Project (<1.6 acres) and is the only stormwater that will not be returned to the same hydrologic basin. Because of potential impacts to captured stormwater within containment structures, this stormwater will be diverted and sent directly to the Refinery wastewater treatment system for treatment and eventual discharge to the Strait of Georgia. This diverted stormwater represents approximately only 0.02 percent of total stormwater to the Terrell Creek basin, which is about 10,000 acres (17 square miles).

3.3.3 Cumulative Impacts

No cumulative impacts to water resources would result from construction, operation, and maintenance of the Cogeneration Project facilities. The use of recycled once-through cooling water will reduce the need for fresh water withdrawals from the Nooksack River by an average of 484 to 556 gpm. ~~The source of the small amount of additional new water required for the proposed Cogeneration Project would be the Nooksack River, but is within the volume allocated by the PUD to the Refinery under the PUD's certified water rights.~~

3.3.4 Unavoidable Adverse Impacts

No significant unavoidable impacts are associated with construction and operation of the Cogeneration Project. The construction and operation of the proposed Cogeneration Project and support infrastructure will not involve stream crossings.

3.3.5 Mitigation of Impacts to Water

3.3.5.1 Water Supply Resources

Cogeneration Project Construction:

During construction, non-potable water would be supplied by a temporary connection to the Refinery. A piping system would distribute the water to taps including a fill station for water trucks located in the work area. Water trucks would ~~to~~ provide dust control during construction. ~~and to provide d~~Drinking water to construction workers will be provided by a water service to be contracted by the site contractor. ~~The water service could be contracted out to a local company or supplied per the site contractor. Water would be applied to the ground surface for dust control.~~ It is anticipated that this water would infiltrate or evaporate. Mitigation would not be required.

Water used for HRSG steam-blow tests is discharged as steam to the atmosphere. Water used for hydrostatic testing will require capture and discharge. The destination of the hydrostatic test water will be to the Refinery wastewater system. The quality of the water will be tested and be within acceptable limits for discharge to the treatment system.

After treatment, the hydrostatic test water will be discharged to the Strait of Georgia through the Refinery Outfall 001.

Cogeneration Project Operations:

1 to ~~2~~ 5 gpm of water would be supplied from the District for potable and sanitation water needs. This quantity of water is small and will not impact water supply resources. Mitigation is not necessary.

~~The Cogeneration Project facility would require an additional 40 gpm (average) of industrial water. The PUD would supply the additional industrial water under an existing agreement with BP and has available certified diversion rights for this water. The Cogeneration Project would minimize water consumption by the use of an ACC, and sharing and reusing water with the Refinery as explained above.~~

Water used for industrial purposes within the Cogeneration plant is to be supplied by PUD from recycled non-contact once-through cooling water from the nearby Alcoa aluminum smelter. The Cogeneration facility would require an average of 2,244 to 2,316 gpm. The PUD would have an average of 2,780 gpm of recycled water, any water not used by the Cogeneration Plant could be provided to the Refinery. The need to withdraw fresh water from the Nooksack River will be reduced by an average of 484 to 556 gpm. The Refinery's water use will also be reduced about 20 gpm as a result of steam provided by the Cogeneration Project.

3.3.5.2 Wastewaters

Industrial wastewaters from the Cogeneration Project would be treated in the Refinery's extensive and efficient wastewater treatment system prior to discharge to the Strait of Georgia through the Refinery's NPDES permitted outfall. Sanitary wastewater would be routed to the District's wastewater treatment plant for treatment and discharge to the Strait of Georgia.

3.3.5.3 Surface Water and Runoff

Stormwater Pollution Prevention Plans (SWPPP) for both construction and operational activities will be prepared for the plant site, and will include stormwater management procedures. The SWPPP for construction will include Temporary Erosion and Sediment Control (TESC) Plans for each phase of the Cogeneration Project site. The SWPPP and TESC Plan will include the specification of all necessary BMPs for construction activities. The grading plan for the site will also specify the necessary BMPs for erosion. All erosion control BMPs will be in place and functioning prior to the start of construction.

Stormwater Collection and Treatment During Construction:

The SWPPP for Construction will include a TESC Plan, the required twelve elements required by Ecology, and general operation and maintenance descriptions of the BMPs used on site. This plan will be completed and on-site for implementation upon commencement of construction. Containment pits or other means of confinement will be provided locally near each potential source of contaminating materials to provide for protection against spillage

BMPs as described in the Stormwater Management Manual for Western Washington would be used to control stormwater runoff during construction and minimize soil erosion. The Stormwater design for the NPDES Permit application for construction activities is provided in Part III, Appendix F: Technical Report on Water (Attachment A, *"Surface Water Management System Design Basis"* and Supplemental Technical Memoranda). Diversion ditches will prevent surface water runoff from areas outside the Cogeneration Project site from entering the site. Stormwater runoff from within the Cogeneration Project site will be contained, collected, and routed to the stormwater treatment and detention system. Silt fences and temporary swales would lead the majority of the runoff to the treatment and detention system. Perimeter silt fences around the ~~construction zone~~disturbed areas will be installed to remove sediment from runoff before it reaches the site boundary. Additional localized silt fencing will be used as required during construction to minimize erosion and transport of soil. Temporary swales would be constructed to accommodate areas being excavated or filled. Once the preliminary cut-and-fill work is complete, the swales will likely remain in place until final grading. The ~~perimeter~~associated silt fence will not be removed until the site has been stabilized. ~~In general, the stormwater treatment and detention system will consist of oil/water separation system equipped with a shutoff value in case of an accidental release for containment.~~ Emergency cleanup equipment and supplies will be available on-site for rapid response. Stormwater will be discharged from the oil/water separation system into a final treatment and detention pond properly sized in accordance with Whatcom County and Washington Department of Ecology (WDOE) requirements, and then eventually discharged to wetlands from the treatment/detention pond. The receiving wetlands will be in the same hydrologic basin from which the stormwater originated.

Stormwater Control and Treatment During Operation:

The SWPPP for Operation will include structural and operational BMPs, a Spill Prevention, Control and Countermeasure (SPCC) Plan, a final stormwater management plan, and general operating procedures. This plan will be completed and on-site upon commencement of plant operation. The SPCC Plan for operation would include structural, operational and treatment BMPs. Structural BMPs will include impervious containment, covers and spill control and cleanup equipment. Operational BMPs will include good housekeeping, employee training, spill prevention procedures, preventative maintenance and inspections. Treatment BMPs will include oils/water separation systems and treatment/detention ponds as discussed below.

The Stormwater design for the NPDES Permit application for Cogeneration Project operation is provided in Part III, Appendix F: Technical Report on Water (Attachment A, *"Surface Water Management System Design Basis"* and Supplemental Technical Memoranda). In summary, the Cogeneration Project site will be divided into three primary drainage areas for the purposes of runoff design. The first area will consist of the switchyard area on the eastern portion of the site. The second area will consist of the remainder of the developed site, which includes the power block, ~~air-cooled condensers~~ cooling tower and administrative functions. The third consists of the storage tank containment areas.

The switchyard area will be surfaced with crushed rock to allow percolation into the soil below. The area would be graded at about 1 percent slope so as to sheet flow excess runoff towards a collection system consisting of swales, catch basins, manholes and underground pipe.

Most of the remaining impervious plant areas will be asphalt-paved or covered with buildings. The finish surfaces in this area would be sloped from a high point located near the center of the main pipe rack towards low points located along the edge of the plant roads. Runoff would be sheet flow across the site towards a collection system similar to that described above. All surface runoff will be captured by the surface drainage system then be directed through an underground piping system to the stormwater treatment and detention system. The stormwater treatment and detention system consists of an oil/water separation system equipped with a shutoff value in case of an accidental release for containment. Emergency cleanup equipment and supplies will be available onsite for rapid response. Stormwater will be discharged from the oil/water separation system into a final treatment and detention pond properly sized in accordance with Whatcom County and Ecology requirements. Stormwater will be discharged to wetlands from the detention pond. The receiving wetlands will be in the same hydrologic basin from which the stormwater originated.

During Cogeneration Project operation, runoff from operational areas within the plant site will be within required limits after treatment. Runoff from surfaces, which potentially may be impacted by grease or oil, will be treated using an oil/water separation system and a wetpond for additional treatment and detention. Oil and grease concentrations will be less than ~~10~~ 15 mg/L, and turbidity will be less than 5 NTU (turbidity units) over background turbidity if background is 50 NTU or less, or be less than 10 percent above background turbidity when background is greater than 50 NTU~~50 NTU~~.

The third area for stormwater collection results from stormwater accumulating within the secondary containment structures for outside tanks. This stormwater is expected to be a small volume and will be separated from other stormwater because of releases that could potentially occur from the tanks. This stormwater will be collected and routed to the Cogeneration Project wastewater system. The water would leave the Cogeneration Project site along with the plant wastewater, be discharged into the existing refinery wastewater treatment system, and then processed by the refinery's wastewater treatment plant. Some secondary containment structures, such as the secondary containment for transformers, would have a very low probability for receiving contaminated stormwater. These systems would be equipped with outlet valves to allow for the inspection of the water before releasing. The operation of these systems would be addressed in the Cogeneration Plant operating procedures to avoid the contamination of the stormwater system.

Runoff quantities from the water supply and natural gas connections during operation will be approximately the same as the natural (existing) conditions. Runoff quality from these areas will be controlled by revegetation of the surface after installation and backfilling. Hence, mitigation is not needed.

3.3.5.4 Groundwater

Spill Mitigation:

A SWPPP will be prepared and implemented for construction activities, which will include worker training, refueling procedures, and operational/structural controls to minimize the potential for spills and leaks from occurring. To minimize the potential release of chemicals during construction, best management practices will be employed. These will include good housekeeping measures, inspections, containment facilities, minimum on site inventory and spill prevention practices. Construction personnel will be instructed regarding the management requirements, and the Applicant's on site Project Manager will be responsible for their implementation.

Prior to operation of the Cogeneration plant, a SPCC Plan will be prepared prior to operational activities, which will contain spill response, containment, and prevention procedures. The SPCC Plan for operation of the plant will include structural, operational, and treatment BMPs. Structural BMPs include impervious containment, covers, and spill control kits. Operational BMPs include good housekeeping, employee training, spill prevention, preventative maintenance, and inspections. Treatment BMPs include ponds and oil water separators as discussed above.

A number of safeguards will be incorporated to mitigate the risks of a release to the environment from stored operational chemicals. These include but are not limited to secondary containment, tank overfill protection, routine maintenance, safe handling practices, supervision of all loading/unloading by plant personnel and the truck driver, and appropriate training of operation and maintenance staff. More details are provided in Part III, Appendix F-Technical Report on Water.

Recharge:

Mitigation is not needed as explained above.

3.3.6 Environmental Impacts of the No Action Alternative

Under the no action alternative, there would be no immediate plans to develop the proposed site. However, the area is within the Heavy Impact Industrial area and could be developed for another project in the future.

Under the no action alternative, a stand-alone merchant plant would likely be built somewhere else to supply needed electricity in the region. This "replacement plant" is not likely to be able to take advantage of the recycling and reuse opportunities that the Cogeneration Project has at the Refinery. ~~, and may also select more water-intensive cooling methods.~~